

Mark P. Waldrop

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PROFESSIONAL PREPARATION

UNIVERSITY OF CALIFORNIA AT BERKELEY, Division of Ecosystem Sciences, Ph.D., Soil Science, 2002

Graduate committee: Drs. Mary Firestone (Chair), Todd Dawson, and Ron Amundson

UNIVERSITY OF CALIFORNIA AT BERKELEY, M.S., Soil Science, 1997

NEW MEXICO STATE UNIVERSITY, B.S. Biology/Ecology, and B.S. Soil Science, 1995

PROFESSIONAL APPOINTMENTS

2007- RESEARCH SCIENTIST, Soil Microbiologist & Biogeochemist, US Geological Survey, Menlo Park, CA.

2005-2007 MENDENHALL POSTDOCTORAL FELLOW, US Geological Survey, Menlo Park, CA. Jennifer Harden, Carol Kendall, and Larry Miller, advisors.

2002-2004 POSTDOCTORAL FELLOW, The University of Michigan, School of Natural Resources and Environment (SNRE). Don Zak, advisor.

1995-2002 RESEARCH ASSISTANT, The University of California, Berkeley, Division of Ecosystem Science, Department of Environmental Science, Policy & Management (ESPM).

PEER REVIEWED PUBLICATIONS

Sinsabaugh, R.L., Lauber, C., Weintraub, M., Ahmed, B., Allison, S., Crenshaw, C., Contosta, A., Cusack, D., Frey, S., Gallo, M., Gartner, T., Hobbie, S., Holland, K., Keeler, B., Powers, J., Stursova, M., Takacs-Vesbach, C., **Waldrop, M.**, Wallenstein, M., Zak, D., Zeglin, L., 2008. Reviews and Syntheses: Stoichiometry of soil enzyme activity at global scale. *Ecology Letters* 11: 1-13

Waldrop, M.P., White, R. III, and T.A. Douglas. 2008. Isolation and identification of cold adapted fungi in the Fox permafrost tunnel, Alaska. *Proceedings of the Ninth International Conference on Permafrost*.

Waldrop, M.P., Harden, J.W. 2008. Interactive effects of wildfire and permafrost on microbial communities and soil processes in an Alaskan black spruce forest. *Global Change Biology*, in press.

Turetsky, M. R., C. C. Treat, M. Waldrop, J. M. Waddington, J. W. Harden, and A. D. McGuire. 2008. Short-term response of methane fluxes and methanogen activity to water table and soil warming manipulations in an Alaskan peatland. *Journal of Geochemical Research-Biogeosciences*, vol 113, *in press*.

- Blackwood, C.B., **Waldrop, M.P.**, Zak, D.R., and R.L. Sinsabaugh. 2007. Molecular analysis of fungal communities and laccase genes in decomposing litter reveal differences among forest types but no impact of nitrogen deposition. *Environmental Microbiology* 9:5 1306-1316.
- Waldrop, M.P.**, Zak, D.R., Blackwood, C., Curtis, C.D., and D. Tilman. 2006. Resource availability controls fungal diversity across a plant diversity gradient. *Ecology Letters*, 9: 1127-1135.
- Zak, D.R., Blackwood, C., and **Waldrop, M.P.** 2006. A molecular dawn for biogeochemistry. *Trends in Ecology and Evolution*, 21(6): 288-295.
- Waldrop, M.P.** and D.R. Zak. 2006. Response of oxidative enzyme activities to nitrogen deposition affects soil concentrations of dissolved organic carbon. *Ecosystems*, 9: 921-933.
- Waldrop, M.P.** and M.K. Firestone. 2006. Response of microbial community composition and function to soil climate change. *Microbial Ecology*, 52 (4): 716-724.
- Waldrop, M.P.** and M.K. Firestone. 2006. Seasonal dynamics of microbial community composition and function in oak canopy and open grassland soils. *Microbial Ecology*, 52 (3): 470-479.
- Sinsabaugh, R.L., Gallo, M.E., Lauber, C., **Waldrop, M.P.**, and D.R. Zak. 2005. Extracellular enzyme activities and soil organic matter dynamics for northern hardwood forests receiving simulated nitrogen deposition. *Biogeochemistry*. 75(2): 201-215.
- Boyle, S., Hart, S.C., Kaye, J.P., and **M.P. Waldrop**. 2005. Restoration and canopy type influence soil microflora in a ponderosa pine forest. *Soil Science Society of America Journal*. 69: 1627-1638.
- Gallo M.E., Lauber C.L., Cabaniss S.E., **Waldrop M.P.**, Sinsabaugh R.L., and D. R. Zak. 2005. Soil organic matter composition in response to experimental N deposition in northern temperate deciduous forest ecosystems. *Global Change Biology*. 11: 1514-1521.
- Waldrop, M.P.**, Zak, D.R., and R.L. Sinsabaugh. 2004. Microbial community response to N deposition in northern forest ecosystems. *Soil Biology & Biochemistry*. 36: 1443-1451
- Waldrop, M.P.**, Zak, D.R., Sinsabaugh, R.L., Gallo, M., and C. Lauber. 2004. N deposition modifies soil C storage through changes in microbial enzymatic activity. *Ecological Applications*. 14 (4): 1172-1177.
- Waldrop, M.P.** and M.K. Firestone. 2004. Microbial community utilization of recalcitrant and simple carbon compounds: impact of oak-woodland plant communities. *Oecologia*. 138 (2): 275 – 284.

Waldrop, M.P. and M.K. Firestone. 2004. Altered utilization patterns of young and old soil C by microorganisms caused by temperature shifts and N additions. *Biogeochemistry*. 67: 235 - 248.

Waldrop, M.P., McColl, J.G., and R.F. Powers. 2003. Effects of forest postharvest management practices on enzyme activities in decomposing litter. *Soil Science Society of America Journal*. 67: 1250-1256.

Waldrop, M.P., T.C. Balser, and M.K. Firestone. 2000. Linking microbial community composition to function in a tropical soil. *Soil Biology & Biochemistry*. 32: 1837-1846.

Waldrop, M.P., Sterling, T.M., Khan, R.A., and W.T. Molin. 1996. Fate of prometryn in prometryn-tolerant and -susceptible cotton cultivars. *Pesticide Biochemistry and Physiology*. 56: 111-122.

NON-PEER REVIEWED PUBLICATIONS

Waldrop, M.P. and M.K. Firestone. 2000. An index of microbial community function that has ecosystem-level consequences. IN Kearney Foundation of Soil Science 1999-2000 Report.

Waldrop, M.P. and M.K. Firestone. 1999. The effect of temperature on the utilization of young and old soil C pools. IN Kearney Foundation of Soil Science 1998-9 Report.

Waldrop, M.P., and M.K. Firestone. 1998. Linking microbial community composition to function in a tropical soil, French Polynesia. IN Kearney Foundation of Soil Science 1997-8 Report.

McColl, J.G., Gressel, N., **Waldrop, M.P.**, Powers, R.F., and C. Drugan. 1997. Enzymatic release of nutrients from organic residues in forests: and index for soil organic matter quality. IN Kearney Foundation of Soil Science 1996-7 Report.

MANUSCRIPTS IN REVIEW OR PREPARATION

Waldrop, M.P., Wickland, K, Berhe, A., and others. Microbial response to simulated thaw in permafrost soils: implications for C cycling in a dynamic environment. In prep

Waldrop, M.P., Zak, D.R., Blackwood, C. and D. Tilman. Microbial resource competition: a new link between plant diversity and soil processes. Submitted.

Waldrop, M.P., Holloway, J., Scow, K. M., Drenovsky, R., Dick, R.L., Goldhaber, M., and D. Smith. Variation in microbial community composition and function across the North American continent. In prep.

Waldrop, M.P., Harden J.W., Pruett, L.E., Doctor D.H., Turetsky M.R., and A.D. McGuire. Microbial communities and biogeochemical processes along a moisture gradient in interior Alaska: implications for landscape transitions in a changing climate. In prep

RESEARCH GRANTS

- 2007** "Acetylene as a Substrate for the Development of Anaerobic Microbial Ecosystems on Primordial Earth: Implications for Microbial Life on Planets and Satellites with Jovian/Titan-like Atmospheres." Ron Oremland, PI (\$10,000 budgeted for Waldrop)
- 2007** "Processes of MeHg production in subhabitats of Twitchell Island ponds" Lisamarie Windham, Mark Marvin-Dipasquale, and Mark Waldrop (\$10,000 budgeted for Waldrop)
- 2007** "Effect of Changing Rainfall and Temperature on Biochemical Composition of Soil Organic Matter", Pacific Northwest National Labs, EMSL NMR grant, co-author with Asmeret Berhe (PI) and Jillian Banfield.
- 2007** "Cross-site peatland moisture gradient analysis to evaluate microbial mechanisms of carbon destabilization", NSF-CZEN International Scholars Program. Lancaster, England (\$9000)
- 2007-2009** "Testing productivity-diversity relationships in soil microbial communities across two continental transects: linking ecological theory to soil processes", USDA NRI Grant. Co-Principal Investigator (\$411,000).
- 2007** "Molecular investigations into a globally important carbon pool: permafrost-protected carbon in Alaskan soils", USGS Venture Capital Fund. Principal Investigator (\$30,000).
- 2007** "Carbon in the Critical Zone: Research priority needs for Bonanza Creek Moisture Gradient", NSF Critical Zone Exploration Network (CZEN) seed grant. Co-Investigator (\$13,000).
- 2005-2007** "Role of microbial ecology in boreal carbon and nitrogen cycling", USGS Mendenhall research grant (\$100,000).
- 2003-2004** "Plant diversity and ecosystem function are linked by soil microbial communities", USDA Soil Biology grant. Co-author, Don Zak PI (\$275,000).
- 2003-2005** "Mechanisms of soil carbon sequestration by nitrogen deposition", DOE Terrestrial Carbon Program. Co-author, Don Zak PI (\$420,000).
- 1997-2001** Kearney Foundation for Soil Science Research Grant (\$96,000).
- 2001** Committee on Research Funding Award, UC Berkeley (\$15,000).
- 2000** University of California, Hopland Research and Extension Center assistance grant.
- 1997** UC Berkeley Gump Research Station Travel and Research grant.

AWARDS

- 2008** First Place, 33rd annual USGS Photo contest
- 1999** Isotope Ecology Course, University of Utah
- 1997** First place, oral presentation, Soil Science Society of America Meeting
- 1995** First place, poster presentation, Weed Science Society of America
- 1994** NSF Research Experiences for Undergraduates (REU) award

Affiliations and collaborations

Bonanza Creek LTER
 Alaska Peatland Experiment (APEX)
 Yukon River Basin Study (YRB)
 Geochemical Landscapes Project (GLP)
 Carbon Capture Wetland Farming (CCWF)
 Lawrence Berkeley National Labs (LBL)
 US Forest Service (USFS)
 National Soil Carbon Network (NSCN)
 North American Carbon Program (NACP)

INVITED TALKS AND WORKSHOPS

2008 USGS Southwest Region Climate Change meeting, Sacramento, CA
2008 "The Science of Carbon Sequestration on California Rangelands". Roundtable Discussion, UC Davis.
2008 NEON Planning meeting- soil microbiology
2008 National Soil Carbon Network (NSCN) Science Steering Committee.
2008 North American Carbon Project (NACP) affiliated project
2008 "Microbial communities and Climate Change". Microbiology Research at the USGS meeting, Denver, CO.
Ongoing "The Yukon Initiative" Workshop and Research Participant. Multi-agency (Federal, State, Local, Tribal, and Academic) collaborative effort to research climate change impacts on water, carbon, and energy in the Yukon Basin, Alaska.
2007 "Plant diversity, microbial diversity, and ecosystem function" UC Irvine, Invited talk.
2007 "Linking Soil Microbial Community Structure & Functions in Climate Change: Working Toward a Unified Approach" A Los Alamos Scientific Workshop for DOE Climate Change Programs. Santa Fe, NM.
2007 "Microscale approaches to Macroscale Issues in Ecology". Sponsored by NSF, Washington, DC.
2005 "Effects of Increased Nitrogen on Ecosystem and Microbial Function Across Different Biomes" Sponsored by NSF LTER, Santa Fe, New Mexico
2003 "Dissertations Initiative for the Advancement of Climate Change Research (DISSCRS)" Workshop Participant. Generated the "The 'Ideal' Climate Change Ph.D. Program" Report in Eos Magazine.

TEACHING EXPERIENCE

2007, 2008 Guest Lecturer for 'Environmental Science', UC Berkeley
2002, 2003 Teaching workshop participant, Center for Research on Learning and Teaching (CRLT), University of Michigan
2001 Guest Lecturer for 'Urban Environment', UC Berkeley
2001 Guest Lecturer for 'Methods for Ecosystem Analysis', UC Berkeley
1997, 1999 Teaching Assistant, Soil Characteristics, UC Berkeley, two semesters

MENTORING

- 2008-2009** Collaborator/mentor with Kristen DeAngelis, Lawrence Berkeley National Labs. Molecular characterization of microbial communities in permafrost soils
- 2008-2009** Postdoctoral mentor for Dorte Petersen. UC Berkeley. N cycling in boreal soils: from microbial populations to process rates.
- 2008** Mentor for Cate Rychel, undergraduate at CSEB, cooperative research with CSEB
- 2006-2008** Dissertation Committee, Katie Amatangelo, Stanford University, "Fern stoichiometry and effects on ecosystem nutrient cycling"
- 2007** Masters student, Richard White, California State University - East Bay, "Quantitative Molecular Techniques"
- 2003-2004** Undergraduate Honors thesis. Casey Curtis, The University of Michigan, "Plant species diversity enhances fungal biomass and activity in an experimental grassland"

SERVICE

- 2008** "Toward Large Scale Assessments of Carbon Turnover and Vulnerability", American Geophysical Union Symposium Organizer
- 2008** Co-taught permafrost field description course. Ninth International Conference on Permafrost, Fairbanks, AK.
- 2007** Geochemistry meets microbiology: frontiers in geochemical research"(title?) Co-organizer, Geological Society of America meeting
- 2008** USDA Principal Investigator meeting organizer, Menlo Park, CA, February 2008
- 2008** Cal State East Bay, Cooperative Research Instructor
- 2008** National Ecological Observation Network, Soil Microbiology Scientists meeting as well as USGS soil assessment meeting
- 2007** USGS Climate workshop participant, Menlo Park, CA
- 2007** "A Trip through Time: Plant Soil Relationships of the Santa Cruz Marine Terraces" Field Trip Organizer, Ecological Society of America annual meeting, San Jose, CA
- 2007** "Microbial Communities along Environmental Gradients: Linking Microbial Ecology and the Ecosystem" Symposium Organizer, Ecological Society of America annual meeting, San Jose, CA
- 2007** 5th grade tour on climate change
- 2007** "Combined Ecological and Geologic Perspectives in Modern Terrestrial Ecosystems" Session Co-Organizer, Geological Society of America
- 2007** "A trip Through Time: Plant – Soil Interactions Over 200k Years of Soil Development", Ecological Society of America Field Trip Organizer
- 2007** "Microbial Communities along Environmental Gradients: Linking Microbial Ecology and the Ecosystem", Ecological Society of America Symposium Organizer
- 2005** "USGS Western Region Colloquium" organizer, Menlo Park
- 2000** "Isotopes and the Environment" conference organizer, UC Berkeley

- Ongoing** USGS public open house exhibitor teaching environmental microbiology to children and adults
- Ongoing** Ecological Society of America Soil Ecology Section student award judge
- Ongoing** Manuscript Reviewer for Nature, Ecology, Microbial Ecology, Soil Biology & Biochemistry, Soil Science Society of America Journal, Global Change Biology, Journal of Geophysical Research – Biogeosciences, Biogeochemistry, Australian Journal of Soil Science. International Journal of Microbial Ecology, FEMS micro Eco,
- Ongoing** Proposal Reviewer for NSF, USDA, DOE, Israel Science Foundation, Kearney Foundation for Soil Science Research

USGS courses:

- “Mentoring Exchange”
- “Basic Firearm Safety Course – Defensive”
- “Wilderness First Aid”

PROFESSIONAL AFFILIATIONS

Ecological Society of America
American Society for Microbiology
American Geophysical Union
Soil Science Society of America

FIRST-AUTHORED PRESENTATIONS

- 2008** “Chemical and Microbiological Characteristics of the Fox Permafrost Tunnel, Alaska”, Ninth International Conference on Permafrost, Fairbanks, AK
- 2008** “Soil Microbial Communities at the Continental Scale: Moving the Microscope to the Map” USDA Project Directors meeting, Menlo Park, CA
- 2007** “Ecology meets geochemistry: A national assessment of the biogeography of microbial communities in soils” Geological Society of America, Denver, CO
- 2007** “Hydrologic control of plant and microbial communities and trace gas fluxes in organic soils of Alaska and the UK”, Critical Zone Exploration Network Meeting, Penn State University.
- 2007** “Linking Microbes and Carbon Biogeochemistry in Northern Soils”, Center for Ecology and Hydrology, Lancaster, UK
- 2007** “Microbial decomposer communities in Alaskan permafrost soils and their response to thaw”, American Geophysical Union, San Francisco, CA
- 2007** “Microbial resource competition: A new link between plant diversity and ecosystem processes” Ecological Society of America Meeting, San Jose.
- 2007** “Plant diversity, microbial diversity, and ecosystem function” UC Irvine, Invited talk.

- 2006 "Carbon cycling and carbon metabolism by soil fungi in a boreal forest: impacts of wildfire and permafrost on functional genes, isotope signatures, and ectomycorrhizae". American Geophysical Union, San Francisco, CA.
- 2006 "Fungal and methanogen functional groups in boreal forests and wetlands in interior Alaska: Abundance, diversity, and process in the face of environmental change". Poster and invited oral presentation, World Congress of Soil Science, Philadelphia, PA
- 2006 "Determining microbial constraints on carbon flow in soil with ^{13}C -PLFA and quantitative PCR". Invited talk. Biogeomon conference, Santa Cruz, CA
- 2005 "Integrating microbial community composition with biogeochemical C and N dynamics: Examples from lignin and polyphenol decomposition". American Geophysical Union, San Francisco, CA
- 2005 "Molecular approaches to biogeochemistry: Linking microbial community landscape patterns to soil carbon fluxes" USGS seminar, internet broadcast, [mms://video.wr.usgs.gov/wrd/28oct2005.wmv](http://video.wr.usgs.gov/wrd/28oct2005.wmv)
- 2005 "Fungal community composition and function in boreal forest soils: Landscape controls and feedback to ecosystem processes" Ecological Society of America, Montreal, Canada
- 2004 "Is microbial diversity dependent upon plant diversity? Results from a common garden experiment" International Society for Microbial Ecology (ISME), Cancun, Mexico
- 2004 "Divergent responses of soil microbial activity and soil C storage to atmospheric N deposition suggests decomposer communities are not functionally redundant" Ecological Society of America, Portland, OR
- 2003 "Response and feedback of soil organisms to nitrogen deposition: Implications for soil carbon sequestration" DOE Terrestrial Carbon Program, Boulder, CO
- 2003 "Nitrogen deposition modifies soil carbon storage by alteration of microbial phenol oxidase activity: Results of an isotope experiment". DOE Terrestrial Carbon Program, Boulder, CO
- 2002 "N deposition affects C flow in soil by altering microbial enzyme activities". Soil Science Society of America, Indianapolis, IN
- 2002 "Isotopic evidence for plant community alteration of C-cycling microbial functional groups in soil". Ecological Society of America, Tucson, AZ
- 2001 "Environmental controls on microbial community composition and soil C pool utilization". International Society for Microbial Ecology, The Netherlands
- 2000 "Using stable isotopes to link microbial community composition and C cycling under altered environmental conditions" American Geophysical Union, San Francisco, CA
- 2000 "Natural abundance stable isotopic ratios of microbial PLFA's: Potential indicators of substrate usage?" Stable Isotopes and the Environment, UC Berkeley
- 2000 "Microbial community composition and C cycling in oak canopy and grassland soils: Response to changes in vegetation and the environment". Soil Science Society of America, Minneapolis, MN

- 2000** "Changes in microbial community composition and carbon cycling in a tropical soil following environmental change". Ecological Society of America, Snowbird, UT
- 1999** "Relationships between microbial community composition and function following conversion of a tropical forest to plantations". Enzymes and the Environment Conference, Grenada, Spain
- 1997** "Enzyme activities and decomposition following clearcutting in the Sierra Nevada, California". Soil Science Society of America, Anaheim, CA
- 1995** "The mechanism of prometryn tolerance in cotton". Western Society of Weed Science, Sacramento, CA
- 1995** "The competitive binding of lead by EDTA in soils and implications for heap leaching remediation". Waste-management Education & Research Consortium, Las Cruces, NM
- 1994** "The effect of temperature on methane flux from arctic wet sedge soils using incubated core tubes". American Society of Agronomy, Seattle, WA